

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(54) MAGNETIC SEPARATION UNITS

(71) We, TILGHMAN WHEELABRATOR LIMITED, a British Company of Broadheath, Altrincham, Cheshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to apparatus for the treatment of castings and relates in particular to a magnetic separation unit for use in such apparatus.

The magnetic separation unit finds particular although not exclusive application in the casting treatment apparatus disclosed in our British Patents Nos. 1,093,785 and 1,124,744.

It is an object of the present invention to provide a magnetic separation unit which is of compact, robust and efficient construction, and which has provision for passing therethrough material without effecting a magnetic separation operation.

According to the present invention there is provided a magnetic separation unit for use in separating magnetisable and non-magnetisable materials comprising a housing enclosing a first passage in which magnetic separation of the materials can take place, a second passage substantially in parallel with the first passage and in which separation of the materials cannot take place and a movable gate within the housing for directing material either to the magnetic separation zonal passage or to the non-separation throughput passage depending on its disposition.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 is a diagrammatic flow diagram of apparatus for treating castings and incorporating a magnetic separation unit in accordance with the present invention; and,

Fig. 2 is a sectional side view of a magnetic separation unit in accordance with the present invention.

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Referring to Fig. 1 of the drawings, the casting treatment apparatus comprises a blasting chamber 10 incorporating a number of impellor wheels 11 (only two shown) and an overhead conveyor 12 for the casting 13 to be treated. Any other suitable form of conveyor may be employed instead of the overhead conveyor 12. The apparatus also comprises an abrasive storage hopper 14 connected to the wheels 11, a vibratory conveyor 15 running under the chamber 10 to collect and remove abrasive material (usually steel shot) which is magnetisable, and sand and other non-magnetisable debris therefrom and deliver it via an elevator 16 to a magnetic separation unit 17 in accordance with the present invention. The magnetisable material and sand and other non-magnetisable debris are initially separated at 15 which incorporates a sieve to remove large debris and are then further separated at 17, the sand and other debris being disposed on a removal conveyor 18, while the magnetisable material is passed to a pneumatic separator 19 where the usable steel abrasive from the smaller non-usable abrasive is separated on the weight/inertia principle.

The usable steel abrasive is then delivered to the storage hopper 14 by an elevator 20.

The magnetic separation unit 17 comprises a casing 21 housing at its top a rotary sieve drum 22 through which the abrasive shot and sand mix are fed axially, the shot and sand falling through the drum 22 to an opening 23 in convergent dividing partitions 24, a gate 25 being provided at the opening 23 and being pivotable, either manually or by power means, between a position (shown in full lines) in which the shot/sand mix is directed towards the magnetic separation zone and a position (shown in dot-dash lines) in which the shot-sand mix is diverted past the magnetic separation zone.

In the latter position of gate 25, which is used when the abrasive shot has been used on annealed or fettled casting and con-

sequently there is no sand present, the shot passes down a chute 26 to a shot trap 27 wherein the shot falls on shot to prevent wear on the casing and from thence to a screw conveyor 35.

In the former position of gate 25, the shot/sand mix is delivered to the magnetic separation zone which in the present instance is two-stage although more than two stages may be provided if desired.

The mix falls on to a weir 28 having a gate 29 controlled by a weighted adjustor unit 30, and then as a curtain, whereof the depth is controlled by the gate 29 on to a first magnetic separator constituted by a non-magnetic metal drum 31 rotatable around a stationary magnet 32 which is preferably multi-poled, an arcuate guide 33 being provided at the upper inlet quadrant of the drum 31. The sand falls off the drum 31 in the direction of arrow A and usually carries with it a minor proportion of the shot while the major porportion of the shot is released by the magnet 32 and falls off the surface of the drum 31 in the direction of arrow B where it is guided by a partition 34 to a screw conveyor 35 which delivers it to the pneumatic separator 19.

The sand with the minor proportion of shot is guided by a partition 36 on to a second weir 37 having a gate 38 controlled by a weighted adjustor 39 and it falls in curtain-like manner from the weir 37 between a quadrant guide 40 and a rotatable non-magnetic drum 41, surrounding a magnet 42, preferably single poled for economic reasons although it may be multi-poled. The sand falls off the drum surface through an opening 43 on to the conveyor 18, and the remaining abrasive shot is released from the drum 41 to fall through an opening 44 from where it is delivered directly to the blast chamber 10.

The drive for the drums 31 and 41 is generally indicated at 45.

A dust separation system may be connected to a pipe 46 at the top of the housing 21 adjacent the sieve drum 22.

Inspection windows and/or doors are provided in the housing 21 at locations 47.

WHAT WE CLAIM IS:—

1. A magnetic separation unit for use in separating magnetisable and non-magnetisable materials comprising a housing enclosing a first passage in which magnetic separation of the materials can take place, a second passage substantially in parallel with the first passage and in which separation of the materials cannot take place and a movable gate within the housing for directing material either to the magnetic separation zonal passage or to the non-separation throughput passage depending on its disposition.

2. A magnetic separation unit as claimed in claim 1, in which there are a plurality of vertically-spaced magnetic separation stages.

3. A magnetic separation unit as claimed in claim 2, in which each magnetic stage comprises a gate-controlled weir located above a rotary metal drum surrounding magnet means.

4. A magnetic separation unit as claimed in claim 3, in which the magnet means are multi-poled.

5. A magnetic separation unit in which the lower or lowest magnet means at least is single-poled.

6. A magnetic separation unit as claimed in any preceding claim, in which the non-separation throughput passage consists of a chute.

7. A magnetic separation unit as claimed in any preceding claim, in which a sieve drum through which material is axially fed is disposed above the gate.

8. A magnetic separation unit for use in separating magnetisable and non-magnetisable materials, substantially as hereinbefore described with reference to the accompanying drawings.

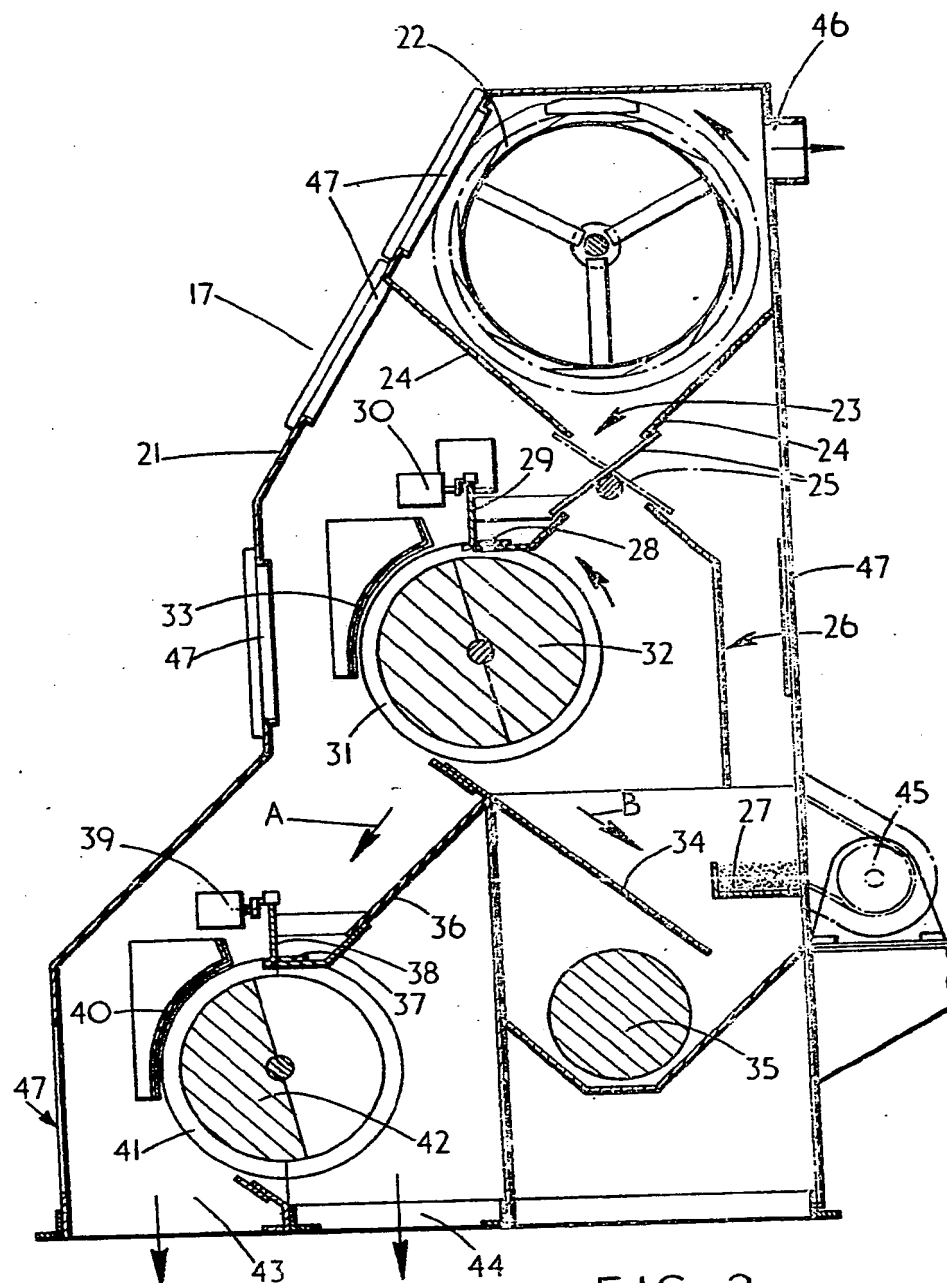
9. Apparatus for treating castings and incorporating a magnetic separation unit as claimed in any one of claims 1 to 8.

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COMPLETE SPECIFICATION

***This drawing is a reproduction of
the Original on a reduced scale
Sheet 1***



FIG. 2